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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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QUALITY AND ACCESSIBILITY OF REHABILITATION IN OBLITERATING ATHEROSCLEROSIS OF THE LOWER EXTREMITY ARTERIES: A CROSS-SECTIONAL SURVEY OF PHYSICIANS

Gulmira Uruzbayeva[1]*, Tolkyn Bulegenov[1], Ernar Mamyrov[1]*, Kenesh Dzhusupov[2], Smailova Zhanargul[1], Berikuly Duman[1], Imanbayev Merey[1], Alpishcheva Saule[1], Bazar Tuleuov[1], Arailym Kussainova[1], Akmaral Mussakhanova[3], Baibussinova, Assel[1].

[1]NJSC "Semey medical university", Semey 071400, Republic of Kazakhstan.

[2]Head of the Public Health Department at the International Higher School of Medicine, Bishkek, 720001-720083, Kyrgyzstan.

[3]NJSC «Astana medical university», Astana, 010000, Republic of Kazakhstan.

Abstract.

Background and Objectives: Obliterating atherosclerosis of the lower extremity arteries (OALEA) is a major cause of morbidity and disability, requiring not only pharmacological and surgical treatment but also structured rehabilitation. Despite international guidelines emphasizing supervised rehabilitation as a key element of care, little is known about physicians' perspectives on its accessibility and quality in Kazakhstan. Aim to evaluate physicians' educational needs, practices, and perceived barriers to rehabilitation in OALEA.

Materials and Methods: A cross-sectional survey was conducted among 217 physicians who met the inclusion criteria and completed a structured questionnaire. Respondents included general practitioners (75.1%, N=163), surgeons (17.1%, N=37), and vascular surgeons (7.8%, N=17). Descriptive and comparative statistical analyses were performed, with chi-square tests applied to assess differences between groups.

Results: The majority of respondents were female (67.7%) with a mean age of 38±11.1 years. Significant associations were observed between specialty and work experience ($p = 0.05$), as well as between specialty and medical category ($p = 0.001$). Most physicians reported professional development once every five years, while one-third trained annually. General practitioners demonstrated the highest engagement in conferences (52.8%), whereas vascular surgeons preferred advanced courses (70.6%) ($p=0.027$; $p=0.03$). Barriers included lack of time among general practitioners (73.6%) and financial constraints among surgeons (54.1%) and vascular surgeons (58.8%) ($p<0.001$). Patient-related barriers were also identified: low adherence (47.2%), harmful habits (47.1%), and poor organization of rehabilitation (up to 58.8%). Almost all physicians (92-100%) supported the creation of vascular schools for patient education.

Conclusion: Physicians in Kazakhstan recognize the importance of rehabilitation in OALEA but face systemic and patient-level barriers that limit its implementation. Expanding supervised rehabilitation programs, introducing vascular schools, and enhancing physician training could significantly improve outcomes. Alignment with international standards should be prioritized in national healthcare strategies.

Key words. Obliterating atherosclerosis of the lower extremity arteries, rehabilitation, physicians' perspectives, educational needs, barriers, Kazakhstan.

Introduction.

Obliterating atherosclerosis of the lower extremity arteries (OALEA) is a progressive chronic disease that significantly impairs blood circulation in the peripheral vasculature, leading to ischemia, functional limitations, and, in advanced cases, a risk of limb loss. The prevalence of OALEA has been steadily increasing worldwide due to aging populations, urbanization, and the growing burden of cardiovascular risk factors such as diabetes mellitus, arterial hypertension, dyslipidemia, and smoking. According to recent epidemiological data, peripheral arterial disease affects more than 200 million people globally, posing not only a serious clinical challenge but also a considerable public health burden [1,2].

Rehabilitation plays a critical role in the comprehensive management of patients with OALEA, complementing pharmacological therapy and surgical or endovascular interventions. Structured rehabilitation programs-particularly supervised exercise therapy -are proven to improve walking distance, reduce symptoms of intermittent claudication, enhance functional independence, and improve overall quality of life [3,4]. At the same time, timely rehabilitation interventions are strongly associated with reduced risk of disease progression and major adverse cardiovascular events [5,6].

However, despite its clinical importance, the quality and accessibility of rehabilitation services for patients with OALEA remain uneven across healthcare systems. Barriers include insufficient awareness among healthcare professionals, limited availability of specialized rehabilitation centers, inadequate funding, and a lack of standardized protocols [7]. Physicians, who play a central role in patient care, are often the first to identify rehabilitation needs and refer patients to appropriate services. Their knowledge, perceptions, and practical experience are therefore essential for understanding existing gaps and for developing strategies to optimize rehabilitation delivery.

A systematic assessment of physicians' perspectives can help identify current barriers and opportunities for improving access to rehabilitation for OALEA patients. Such data are crucial for informing healthcare policy, designing educational initiatives, and ensuring patient-centered care. Against this background, the present study aims to evaluate the quality and accessibility of rehabilitation in obliterating atherosclerosis of the lower extremity arteries through a cross-sectional survey of physicians.

Materials and Methods.

The study was conducted among practicing physicians directly involved in the process of medical rehabilitation at various

levels of medical care in the Republic of Kazakhstan. Data were collected from May 25, 2024 to April 5, 2025. The extended duration of data collection was determined by the necessity to achieve the target sample size and to accommodate physicians' differing clinical workloads, schedules, and availability for participation. This approach helped to reduce non-response bias and ensured more balanced representation across professional categories. The average time required to complete the questionnaire was 15 minutes.

The inclusion criteria were: surgeons, general practitioners and vascular surgeons from all levels of healthcare institutions involved in the implementation of rehabilitation measures for obliterating atherosclerosis of the lower extremity arteries. The study included 217 physicians who met the inclusion criteria and fully completed the questionnaire.

The structured questionnaire was developed by the authors based on the World Health Organization (WHO) recommendations on rehabilitation and adapted to the national context of Kazakhstan. The design and reporting adhered to international guidelines for survey studies [1]. The questionnaire development process consisted of the following stages: initial draft preparation based on WHO guidelines and local policy documents; expert review by a panel of five specialists in vascular surgeons, rehabilitation, general practitioners and public health; pretesting (pilot testing) with 25 physicians not involved in the main survey to assess content clarity, linguistic and cultural relevance, and time burden. Two rounds of revision based on expert and pilot feedback.

The questionnaire was administered in Google Forms online service, and an informed consent form was provided at the beginning of the questionnaire. Confidentiality of the study was guaranteed.

The final version of the questionnaire consisted of closed-ended questions and covered the following thematic sections: socio-demographic and professional characteristics; self-reported experience and involvement in vascular rehabilitation; physicians' perspectives on the availability and quality of rehabilitation services; suggestions for improvement of current practices. To check the reliability of the questionnaire, the internal consistency of the questionnaire was calculated by determining the Cronbach's &-coefficient. The questionnaire has high validity (Cronbach's > 0.7), indicating a satisfactory level of reliability of the questionnaire scales.

The study was conducted in accordance with the principles of the Declaration of Helsinki and was approved by the Ethics Committee of Semey Medical University (Protocol No. 2, dated December 12, 2023). Written informed consent was obtained from all participants prior to their inclusion in the study.

Statistical Analysis.

Quantitative variables were presented as medians with minimum and maximum values due to the presumed non-normal distribution. Categorical variables were expressed as absolute numbers (N) and percentages (%). Group comparisons for categorical variables were performed using Pearson's chi-square (χ^2) test or Fisher's exact test, as appropriate. All statistical tests were two-tailed, and a p-value of < 0.05 was considered statistically significant. Statistical analyses were performed using SPSS version 24.0.

Results.

The study included 217 physicians who met the inclusion criteria and fully completed the questionnaire. The respondents were: general practitioners 75.1% (N=163), surgeons 17.1% (N=37), vascular surgeons 7.8% (N=17). In terms of gender, the majority of respondents were female 67.7% (N=147). The mean age was 38±11.1 years. Table 1 presents the distribution of physicians according to specialty — general practitioners, surgeons, and vascular surgeons - by total work experience and medical category.

Among general practitioners, 18.4% (N = 30) had less than three years of experience, 9.2% (N = 15) had 3–5 years, 28.8% (N = 47) had 6–9 years, and 43.6% (N = 71) had more than ten years of practice. Among surgeons, 2.7% (N=1) had less than three years of experience, 2.7% (N =1) had 3–5 years, 24.3% (N=9) had 6–9 years, and 70.3% (N=26) had more than ten years. Among vascular surgeons, 5.8% (N=1) had less than three years of experience, 11.8% (N=2) had 3–5 years, 11.8% (N = 2) had 6–9 years, and 70.6% (N=12) had over ten years. The relationship between work experience and specialty was statistically significant (p = 0.05). Regarding medical category, 49.1% (N=80) of general practitioners had no category, 11.7% (N=19) held the second category, 19.0% (N=31) the first, and 20.2% (N=33) the highest category. Among surgeons, 16.3% (N=6) had no category, 13.5% (N=5) had the second, 40.5% (N=15) the first, and 29.7% (N=11) the highest category. Among

Table 1. *Distribution of physicians by specialty, total work experience, and medical category.*

Variables	**Specialty**			**P**
	General Practitioners abs. (%)	**Surgeon abs. (%)**	**Vascular surgeons abs. (%)**	
Total work experience				
< 3 years	30 (18.4 %)	1 (2.7 %)	1 (5.8 %)	
3–5 years	15 (9.2 %)	1 (2.7 %)	2 (11.8 %)	0.05
6–9 years	47 (28.8 %)	9 (24.3 %)	2 (11.8 %)	
≥ 10 years	71 (43.6 %)	26 (70.3 %)	12 (70.6 %)	
Medical category				
No category	80 (49.1 %)	6 (16.3 %)	4 (23.5 %)	
Second	19 (11.7 %)	5 (13.5 %)	1 (5.9 %)	0.001
First	31 (19.0 %)	15 (40.5 %)	3 (17.7 %)	
Highest	33 (20.2 %)	11 (29.7 %)	9 (52.9 %)	

Table 2. *Educational Preferences and Perceived Barriers to Accessing Professional Information among Physicians of Different Specialties in the Rehabilitation of Patients with Obliterating Atherosclerosis of the Lower Extremity Arteries.*

Variables	**Specialty**			**P**
	Surgeon abs. (%)	**General Practitioner abs. (%)**	**Vascular surgeons abs. (%)**	
1	2	3	4	5
Professional development				0.44
Annually	10 (27.0%)	56 (34.4%)	6 (35.3%)	
once every 3 years	8 (21.6%)	31 (19.0%)	2 (11.8%)	
once every 5 years	16 (43.2%)	55 (33.7%)	9 (52.9%)	
I don't raise	3 (8.2%)	21 (12.9%)	0	
Scientific conferences				0.027
Don't attend	4 (10.8%)	19 (11.7%)	0	
1-2 times a year	10 (27.0%)	36 (22.1%)	7 (41.2%)	
1-2 times in 5 years	12 (32.4%)	22 (13.5%)	3 (17.6%)	
I try to attend all conferences of interest	11 (29.7%)	86 (52.8%)	7 (41.2%)	
The need to supplement knowledge about obliterating atherosclerosis of the lower extremity arteries and its rehabilitation measures				0.09
Yes	37 (100.0%)	155 (95.1%)	17 (100.0%)	
No	0	8 (4.9%)	0	
Preferred forms of training Reading medical literature				0.3
Yes	4 (10.8%)	36 (22.1%)	4 (23.5%)	
No	33 (89.2%)	127 (77.9%)	13 (76.5%)	
Prefers advanced courses in major medical centers or research institutes				0.12
Yes	15 (40.5%)	85 (52.1%)	12 (70.6%)	
No	22 (59.5%)	78 (47.9%)	5 (29.4%)	
Prefer distance learning (lecture, seminar)				0.03
Yes	5 (13.5%)	50 (30.7%)	2 (11.8%)	
No	32 (86.5%)	113 (69.3%)	15 (88.2%)	
Prefer to attend master classes				0.14
Yes	6 (16.2%)	44 (27.0%)	7 (41.2%)	
No	31(83.8%)	119 (73.0)	10 (58.8%)	
Preferring seminars and conferences				0.001
Yes	5 (13.5%)	65 (39.9%)	2 (11.8%)	
No	32 (86.5%)	98 (60.1%)	15 (88.2%)	
There is a lack of time in obtaining information				<0.001
Yes	14 (37.8%)	120 (73.6%)	11 (64.7%)	
No	23 (62.2%)	43 (26.4%)	6 (35.3%)	
Difficulties in obtaining professional information: financial constraints				<0.001
Yes	20 (54.1%)	45 (27.6%)	10 (58.8%)	
No	17 (45.9%)	118 (72.4%)	7 (41.2%)	
Difficulties in obtaining professional information: lack of access to the internet				0.17
Yes	0	10 (6.1%)	0	
No	37 (100.0%)	153 (93.9%)	17 (100.0%)	
Difficulties in obtaining professional information: lack of access to information databases in the workplace				0.75
Yes	5 (13.5%)	28 (17.2%)	2 (11.8%)	
No	32 (86.5%)	135 (82.8%)	15 (88.2%)	
Difficulties in obtaining professional information: language barrier				0.05
Yes	5 (13.5%)	15 (9.2%)	2 (11.8%)	
No	32 (86.5%)	148 (90.8%)	15 (88.2%)	

vascular surgeons, 23.5% (N=4) had no category, 5.9% (N=1) had the second, 17.7% (N=3) the first, and 52.9% (N=9) the highest category. Statistically significant differences between specialties were confirmed (p = 0.001).

As shown in Table 2, the majority of physicians across all specialties reported regular professional development, most often once every five years, with no significant differences between groups (p=0.44). Annual training was observed in approximately one-third of respondents. Participation in scientific conferences varied significantly: general practitioners demonstrated the highest engagement, with 52.8% attending all relevant conferences, compared with 29.7% of surgeons and 41.2% of vascular surgeons (p=0.027).

Almost all respondents indicated the need to supplement knowledge on obliterating atherosclerosis and rehabilitation measures (95–100%, p=0.09). Preferred training formats included advanced courses at major medical centers and research institutes, particularly among vascular surgeons (70.6%), and distance learning, which was most common among general practitioners (30.7%) (p=0.03). Attendance at seminars and conferences was also significantly more frequent among general practitioners (39.9%) compared to surgeons (13.5%) and vascular surgeons (11.8%) (p=0.001). Regarding barriers to professional information, lack of time was most often reported by general practitioners (73.6%) and vascular surgeons (64.7%), whereas financial constraints were more prevalent among surgeons (54.1%) and vascular surgeons (58.8%) (p <0.001). Access-related barriers, such as limited internet or databases, were less frequently noted, while language barriers were reported by 9-13% of respondents (p=0.05).

As shown in Table 3, most physicians reported advising patients on rehabilitation on a regular basis (75.7% of surgeons, 81.6% of general practitioners, and 100% of vascular surgeons, p=0.31). Almost all respondents considered rehabilitation necessary for patients with obliterating atherosclerosis (93-100%, p=0.09). Patient attitudes were most frequently described as “interested,” although vascular surgeons more often noted a positive perception (41.2%). Barriers to rehabilitation demonstrated statistically significant differences: lack of information was more frequently emphasized by general practitioners (28.2%) and vascular surgeons (29.4%) compared to surgeons (8.1%) (p=0.03); low patient adherence was highlighted predominantly by general practitioners (47.2%) (p=0.002); harmful habits were considered a barrier by 47.1% of vascular surgeons versus 5.4% of surgeons (p=0.002). Poor organization of rehabilitation was most often reported by vascular surgeons (58.8%) and surgeons (43.2%) compared to 16.6% of general practitioners (p<0.001). The necessity of establishing patient schools for vascular diseases was confirmed by nearly all respondents (92-100%, p=0.021).

Discussion.

The present study revealed a high level of awareness among physicians regarding the importance of rehabilitation in patients with obliterating atherosclerosis of the lower extremity arteries. Almost all respondents confirmed the necessity of rehabilitation measures (93–100%), which corresponds to international recommendations emphasizing supervised exercise therapy as a cornerstone of peripheral arterial disease (PAD) management [4]. Similar to data from previous systematic reviews, structured rehabilitation is recognized as effective in improving walking distance, functional status, and quality of life [8].

Differences between specialties were evident. General practitioners more often participated in conferences and distance learning, reflecting their broader patient population and role in primary care. Vascular surgeons demonstrated higher interest in advanced courses at major medical centers, consistent with their focus on complex cases requiring specialized interventions. Such variations in preferences confirm the need for differentiated approaches to continuing medical education [9].

Barriers to professional development and access to information remain a critical problem. General practitioners predominantly noted lack of time (73.6%), whereas surgeons and vascular surgeons emphasized financial constraints (54.1% and 58.8%, respectively). These findings are consistent with reports from other countries where workload and funding limitations are key obstacles to evidence-based practice implementation [10].

Patient-related barriers were also significant. General practitioners more frequently indicated low adherence (47.2%), while vascular surgeons highlighted harmful habits (47.1%) and poor organization of rehabilitation (58.8%). These data confirm the multifactorial nature of rehabilitation challenges, where both patient behavior and systemic issues limit effectiveness [11]. Important, almost all physicians supported the establishment of structured educational programs such as vascular schools, which have been proven to improve adherence and outcomes in chronic cardiovascular diseases [12-16].

In the context of Kazakhstan, the results demonstrate systemic gaps: insufficient infrastructure, organizational shortcomings, and limited access to rehabilitation services. Despite reforms in cardiovascular care, rehabilitation remains underdeveloped compared with diagnostic and surgical approaches. The introduction of vascular schools, expansion of supervised rehabilitation programs, and targeted physician training would significantly enhance patient outcomes, aligning with international standards [13-17].

Limitations.

This study has several limitations. Being a cross-sectional survey, it is prone to selection and response biases, and the reliability of self-reported data may affect the accuracy of the findings. The relatively small number of vascular surgeons (n=17) could have reduced the statistical power of subgroup analyses and limited the generalizability of the results.

It should also be noted that no significant updates to national policies, clinical guidelines, or professional recommendations on rehabilitation occurred during the data collection period, which ensures the methodological consistency and comparability of the results.

Nevertheless, these findings provide important preliminary evidence and can serve as a basis for further large-scale and comparative studies.

Conclusion.

Physicians in Kazakhstan show a strong awareness of the critical role of rehabilitation in obliterating atherosclerosis of the lower

Table 3. *Physicians' practices, patient attitudes, and perceived barriers to rehabilitation in obliterating atherosclerosis of the lower extremity arteries by specialty.*

Variables	**Specialty**			**P**
	Surgeon abs. (%)	**General Practitioners abs. (%)**	**Vascular surgeons abs. (%)**	
1	2	3	4	5
Experience of rehabilitation work at the population level (release in the media)				
Yes	14 (37.8%)	84 (51.5%)	7 (41.2%)	0.3
No	23 (62.2%)	79 (48.5%)	10 (58.8%)	
Do you advise patients on rehabilitation?				0.31
Only at the request of patient	7 (18.9%)	24 (14.7%)	0	
Always	28 (75.7%)	133 (81.6%)	17 (100.0%)	
Don't give	2 (5.4%)	6 (3.7%)	0	
Patients' attitude towards rehabilitation activities				0.09
Actively	7 (18.9%)	38 (23.3%)	1 (5.9%)	
Interested	23 (62.2%)	99 (60.7%)	9 (52.9%)	
Positively	7 (18.9%)	26 (16.0%)	7 (41.2%)	
Do you think it is necessary for patients with atherosclerosis of the lower extremities to have rehabilitation activities?				
Yes	36 (97.3%)	152 (93.3%)	17 (100.0%)	0.09
No	1 (2.7%)	11 (6.7%)	0	
Do you refer patients on the «D» list with atherosclerosis of the lower extremities to rehabilitation treatment when necessary?				0.15
Yes	25 (67.6%)	132 (81.0%)	12 (70.6%)	
No	12 (32.4%)	31 (19.0%)	5 (29.4%)	
What is the failure of patients to rehabilitate: low level of education				0.06
Yes	9 (24.3%)	45 (27.6%)	3 (17.6%)	
No	28 (75.7%)	118 (72.4%)	14 (82.4%)	
What is the failure of patients to rehabilitate: lack of necessary information on disease				
Yes	3 (8.1%)	46 (28.2%)	5 (29.4%)	0.03
No	34 (91.9%)	117 (71.8%)	12 (70.6%)	
What is the failure of patients to rehabilitate: low patient commitment to treatment				
Yes	6 (16.2%)	77 (47.2%)	6 (35.3%)	0.002
No	31 (83.8%)	86 (52.8%)	11 (64.7%)	
What is the failure of patients to rehabilitate: the presence of harmful habits				0.002
Yes	2 (5.4%)	35 (21.5%)	8 (47.1%)	
No	35 (94.6%)	128 (78.5%)	9 (52.9%)	
What is the failure of patients to rehabilitate: poor organization of rehabilitation				<0.001
Yes	16 (43.2%)	27 (16.6%)	10 (58.8%)	
No	21 (56.8%)	136 (83.4%)	7 (41.2%)	
Do you think it is necessary to run a school for patients with vascular diseases of the lower limbs				0.021
Yes	37 (100.0%)	150 (92.0%)	17 (100.0%)	
No	0	13 (8.0%)	0	

extremity arteries, with nearly all participants acknowledging its importance. At the same time, differences were noted between specialties in terms of professional development, preferred training formats, and perceived obstacles. General practitioners most often pointed to time constraints, whereas surgeons and vascular surgeons emphasized financial and organizational barriers. Patient-related challenges-including poor adherence, harmful lifestyle habits, and insufficient awareness-were also identified as major factors limiting the effectiveness of rehabilitation.

These results highlight the necessity of systemic steps to strengthen rehabilitation medicine in Kazakhstan. Key priorities include the expansion of supervised rehabilitation services, the establishment of patient-oriented vascular schools, and the development of specialized physician training programs. Bringing national practice closer to international standards should be viewed as a strategic direction to improve both the quality and accessibility of rehabilitation for patients with peripheral arterial disease.

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Institutional Review Board Statement.

This study received permission from the Ethics Committee of Semey Medical University (Protocol # 2 of 12.12.2023).

Informed Consent Statement.

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Data Availability Statement.

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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Conflicts of Interest.

The authors declare that they have no competing interests.

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